Spring 5-18-2019

The Behavioral Determinants of Well-Being in Sierra Leone

Madison Levine
madison.e.levine@gmail.com

The Behavioral Determinants of Well-Being in Sierra Leone

Madison Levine
Advisor: Professor Alessandra Cassar

Department of Economics
University of San Francisco
2130 Fulton Street
San Francisco, CA 94117

Thesis Submission for the Masters of Science Degree
in International and Development Economics

e-mail: *melevine2@dons.usfca.edu*

Spring 2019

Abstract: Ensuring the needs of individuals are met leads to a more prosperous economy. Healthy economic activity is dependent on a supported community of people. These people express different levels of happiness depending on where they come from and make behavioral choices every day influenced by their association with their community. Currently most subjective data have come from western educated industrialized rich and democratic (WEIRD) areas. These results are placed as generalizations across all other countries and are not giving an adequate representation of well-being for the population in non-WEIRD areas. Our study outlines an in-depth survey covering subjective well-being measurements corresponding with experimental economic tasks in a sample size of 253 students in Sierra Leone. The tasks highlight competitive and risk-taking behavior expressed to see if gender has an effect in choices made. From the choices, we can make the link to examine the effect on the subject's overall well-being. It is important to note that these determinants may be endogenous to each other because we cannot explicitly determine if the behavior causes well-being or if the well-being decides the behavior. Though, with these determinants, we find correlational results that suggest gender plays a significant role in how stressed out or happy the subjects are. We also find that income may be a larger determinant in overall well-being of all the subjects.

1. Introduction[1]

Determining an individual's subjective well-being has been attempted for decades with basic utility and household functions. Researchers began to see that was not the most accurate way to depict what is occurring within the lives of individuals when a variety of other factors are prominent and in need when making decisions in life. Decision making does not follow the rational model of how to maximize utility functions when you consider what consequences may arise from one choice and yet we see that poor decisions are still being made. This is common when resources are scarce and individuals' bandwidth are taxed tremendously, therefore, immediate needs overshadow future needs and tunnel our vision of choices (Mullainathan & Shafir 2014). Aside from resource-scarcity, gender has a deep role in how those resources are allocated. When society is patriarchal, many of the resources are distributed unequally and providing the women with much less. This leads to women obtaining fewer rights, whether that is with land rights or household rights, and the ability to continue education is much more difficult. All of these factors combined with being poverty-stricken, the overall subjective well-being of individuals' can be drastically affected and seen through the decision making choices. These behavioral characteristics will be highly correlated with how the individual is feeling due to constraints in their lives.

Unfortunately, most studies on subjective well-being have been done within Western, Educated, Industrialized, Rich and Democratic (WEIRD) places. Henrich et al focused on how this is a huge issue when we are making strong generalized statements about well-being for the world's population. In their study, they found that 96% of all studies in this topic of interest were from developed and Western countries with nearly all the participants being undergraduate students (Henrich et al, 2010). Their sample had been capturing around 12% of the world's

[1] Acknowledgments: This research would not be possible without my research partner, Ashwini Shridhar with the countless days of us bouncing ideas off each other and finding solutions to problems. I am extremely appreciative of Professor Alexandra Orsola-Vidal with her generous advice and guidance from the very beginning all the way to the end. My advisor, Professor Alessandra Cassar has helped in more ways than I can count, always being there to help fix those last-minute errors and I hold the utmost gratitude towards her and her guidance. Professor Jesse Anttila-Hughes gave much needed insight in those times of panic and talking through complicated areas of methodology. I also want to make a big thank you to Professor Yaniv Stopnitzky for his countless help at any time of the day. He believed in us for an overarching ambitious project and would always be around to support my partner and I whenever we needed anything. He was a very important factor in our success.

population which is not a representative sample of the rest of the population. This is not a justifiable reason for researchers to be making broad generalizations about behavioral decision making linked with the well-being in other countries where the livelihood is drastically different in terms of income, gender-inequality, and behavioral characteristics such as competitive and risk-taking natures.

In Sierra Leone, which is a patriarchal society, there are drastic statistical differences among girls and boys. Nearly the whole population goes to primary school, yet when we look at who continues into secondary school we see that 39.9% of boys are continuing while only 33.2% of girls are (unicef.org, 2012). Both drop exponentially; however, we see that there is a significant difference between the number of boys continuing compared to girls. Contraception prevalence in the country is around 11% with births by age 18 being around 38% (unicef.org, 2012). When having a relatively high percentage of births by 18, maternal mortality rates are a key variable to consider when assessing the livelihood of a country. Maternal mortality rates in Sierra Leone are one of the world's highest estimated at 1,165 deaths per 100,000 live births (unfpa.org, 2017). Not only are women dying due to lack of care overall for women, but they are also being beaten and feel as though that is what they deserve. The justification of wife-beating from women's point of view is roughly 66% of the population (unicef.org, 2012).

Gender disparities are highly prevalent in many countries and can be linked back to a term coined by Amartya Sen of "missing women" to capture how the proportion of women is lower in the developing world due to girls and women never being born, missing in early childhood, dying throughout their reproductive years and old age (Duflo, 2012). Esther Duflo covers how besides the mortality, girls lag behind their brothers by failing to get an education, jobs, or even political representation (Duflo, 2012). Differences between genders happen opportunity-wise, but they also occur in behavior when we look at the competition and risk aversion. Women tend to be significantly less competitive than men are and much more risk-averse (Croson & Gneezy, 2009).

Due to the lack of research and literature on subjective well-being data in countries other than WEIRD areas, our sample resides in rural Sierra Leone in West Africa. We look at the school students within three areas of the country. There are two schools in each of the areas, totaling to six schools with a sample of 159 girls and 94 boys. We designed a survey capturing four outcome variables of Stress, Happiness, Future Aspirations, and Disempowerment. This was

done through multiple questions about each of the outcome variables to form a single Kling Index for each that equally weights and directs the questions answers into one variable. This variable then becomes our outcome variable in the final analysis. Matched with the survey, we use experimental economic tasks to look at the specific behavioral characteristics. These characteristics are determined through actions made inside the experimental tasks that have been common throughout competitive and risk-averse literature and is tailored to the population of interest to accurately capture their decisions. We use these behavior variables as explanatory variables, in the final analysis, to find correlated results as to how the subjects are feeling overall. In the final analysis, we find that the behavioral characteristics can be strongly correlated indicators of a few of the outcome variables.

The rest of this paper will be organized as follows: In Section 2 we will discuss the past literature of social well-being including income scarcity, competitive and risk-taking behavior. Section 3 will be the data and sample where we outline how the experimental data can show behavioral choices within subjects. Section 4 discusses all the results and will go in depth on the competitive and risk-taking choices being determinants of the overall well-being of children in Sierra Leone. We will end with a brief conclusion in Section 5 summarizing results overall and discussing future research.

2. Literature Review

2.1 Social Well-Being (SWB)

An individual's quality of life determines drastically on who they are and where they are born to see what they are able to achieve. Amartya Sen contributed to the economic theory of subjective well-being through his capability approach. The main innovation of this approach is widening the scope of what is being counted towards societal development and an individual's well-being (Sen, 1995). There are three key components to this theoretical framework which are: functionings, capabilities, and freedom (they all happen to be endogenous to each other). We have functionings as what a person is able to do or be, capabilities are expressed as the different functionings he or she could be or do through opportunities that functionings allowed. Freedom then depends on the social environment with all of the opportunities to have variation within. Formally, according to Ai-Thu Dang, we can represent the function as:

$$Q(X_i) = [b_i \mid b_i = f(c(x_i) \mid z, z, z), \text{ for some } f() \in F_i \text{ and for some } x \in X]$$

we have x_i as the vector of commodities person I possess'; X is the set the possible commodity vectors; $c(x_i)$ is the function that converts the commodity into a vector of characteristics; $f()$ is a "personal utilization function" Sen has used as his terminology, it can also be a conversion function of those commodity characteristics into a function vector b; F_i is all of the possible conversion functions; z, z, and z are vectors of personal, environmental, and social factors, that influence the array of rates of the resources converting into the functions (outcome or accomplishment) and capabilities (real opportunities or positive freedoms) (Sen, 1995).

More recently, well-being is referred to by psychologists as an umbrella term surrounding how we think and feel in our lives (Dolan et al, 2008). In other words, SWB is overall life satisfaction and happiness that individual's achieve (Björkman, 2018). Through analysis, SWB has more determinants than once previously thought and were then described as following:

$$\text{SWB}_{\text{report}} = r(h)$$

where $\text{SWB}_{\text{report}}$ is self-reported SWB of a response to overarching happiness of life question and can be more empirically modeled as:

$$\text{SWB}_{it} = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \ldots + \varepsilon_{it}$$

Inside this model we have SWB determined by a variety of factors (X's) encompassing social, environmental and economic aspects (Dolan et al, 2008).

Through the meta-analysis from Dolan et al, utilizing this model above, they find that having inadequate health, separation, being unemployed and having a lack of social contact is extremely negatively associated with SWB (Dolan et al, 2008). Complementary to this equation, Björkman looked at how well-being varies between different climates, natural disasters, how much solar radiance there is, the distance located from the coast, water pollution levels and air pollution variables (Björkman, 2018). Through their geospatial the analysis they found a significant correlation at the 5% level of increased well-being when living is within one kilometer of the coast; whereas if subjects are exposed to natural disasters such as a tornado or avalanche, their well-being decreases at the 10% level (Björkman, 2018).

Not only is subjective well-being a result of those various factors, we see through Kingdon & Knight from a *World Values Survey*, that happiness increases when absolute income is increasing, although they do not increase proportionally and eventually diminish off (Kingdon & Knight, 2006). Their main comment is around how the country observed at is a key variable because what depends most on happiness, with income, is the ability to obtain biological and psychological needs (Kingdon & Knight). Along with those, if the country has a high unemployment rate or has economic insecurity such as inflation, happiness seems to follow a downward trend (Kingdon & Knight). We know that income is one of the main components to how individuals live their lives, so with lower levels of income, there tends to be an overall lower level of happiness. Living in poverty leaves peoples' minds with extremely small bandwidth. This means that along with the daily activities everyone does, add to that income instability, with potential job unemployment with all bills that keep stacking up and needing to be paid, a person is stretched so thin that they cannot keep up (Mullainathan & Shafir 2014). Subjective well-being is now seen as a term that encompasses a large number of dependent variables. All of these variables happen to be intertwined with each other, which makes it more difficult to dissect and understand what is causing what, but it is important to do more research in to attempt to have a more clear understanding. What we are doing here is adding in the subjective well-being literature where income and behavioral characteristics are being strong indicators to our subject pools' overall well-being. We take in consideration most of the components spoken about in this section and see promising results.

2.2 Gender Inequality

When it comes to education, women have drastic disadvantages when compared to men. Within low- and moderate-income countries, there is an enrollment rate of 34 percent for girls in secondary school while for boys it was 41 percent in 2010 (Duflo, 2012). In the labor market opportunities, women are not as likely to work, they earn less than men for related work, and they are more likely to be facing poverty even while working (Duflo, 2012). We see that women spend more time with housework and childcare while their time on market work is cut in half. Seen as of July 2011 females' political representation had been 19.4 percent of members in parliament and when it comes to legal rights, women in most countries have nonexistent independent rights to own land or manage property without their husband (Duflo, 2012).

Education and fertility has been seen to have a negative relationship where more education seems to reduce fertility. Many girls who get pregnant while still in school will end up dropping out or even be kicked out depending on where in the world they live (Duflo et al, 2015). If girls are given the education around sexual relationships and given the opportunity to take control of what happens with their bodies, we see a dramatic change in their decisions. Duflo's randomized study in Kenya showed how when educating girls about HIV and sexual protection through condom usage, with subsidizing their education, it led to girls having less unprotected sex whether they were in committed or casual relationships. (Duflo et al, 2015). It also led to some girls switching from committed to casual relationships because being in a committed relationship meant a higher chance of becoming pregnant (Duflo et al, 2015). One of their findings within this study was that the girls who were at the margin of dropping out of school while education costs were reduced, they were able to prolong pregnancy until they finished their education implying that schooling decisions are fertility are jointly decided (Duflo et al, 2015).

In Nigeria during the late 1990s, the government provided tuition-free primary education while also increasing the number of classrooms and teacher-trainings within the country (Osili, 2007). From this, Osili examines if this addition affected female education attainment. They found that the decrease in schooling costs combined with the expansion of access to primary school substantially increased the amount of female education while decreasing fertility by 16% before the age of 25 (Osili, 2007). Higher maternal education leads to lower levels of child mortality as well (Pamuk et al, 2011). Through the Demographic and Health Survey (DHS) data, Pamuk et al looked at low-income countries to empirically see how maternal education affects child mortality. They find that when mothers have primary education, compared to no education infant deaths decrease by 22% (Pamuk et al, 2011). For those who have completed secondary school, the percentage is decreased by 57% (Pamuk et al, 2011). Geography is an important component as well, in the more rural areas within the same study, infant mortality had an increase of 33% (Pamuk et al, 2011).

It is clear what benefits arise from educating women and decreasing the gender inequalities around the world. We know that higher education leads to fewer births, which would also insinuate fewer maternal mortalities occurring. Giving women education on how to delay fertility have exponential effects of giving women the option to use protection and stay in school longer while choosing what sort of relationship they want to be in. There are fewer infant deaths due to higher maternal education and women are an asset to the economy. If we want to achieve

a healthier economy globally, we need to decrease the gender disparities invoked on women everywhere to see them more engaged in aspects of daily life involving decision making.

2.3 Competitive Behavior

Current literature has shown that men are more competitive than women are, but there are certain studies that show this depends on the context as an important determinant of their willingness to compete. Bjorvatn et al have experimental data from the competition in urban Uganda where they had sets of multiple-choice questions on mathematics and general topics (Bjorvatn et al, 2016). Their results show us that within the urban schools there are no statistically significant gender gaps between how competitive boys and girls behave. When we move to the rural context though, females are significantly less competitive than males are (Bjorvatn et al, 2016). In the UK, Booth, and Nolen run experiments with school compositions of all female schools and mixed schools. In their results, they show that the gender composition of the group and from which school they come from matters (Booth & Nolen, 2012). When girls come from an all-girls school and they compete against the other gender, there is no gender gap; yet the girls from the co-educational school are competing against the opposite gender, they are significantly under-competing their male counterparts (Booth & Nolen, 2012).

If we bring a scenario to subjects where they can choose their opponent in a competitive environment, we see that women's willingness to compete does indeed rise, although it does not fully eliminate the gender gap (Gupta et al, 2012). Previously losing in a competition seems to affect males and females a little differently though. Through a competition experiment, it is found that when men win, they are more likely to continue to compete; however, if they lose they become much more risk-averse (Filippin & Gioia, 2016). Whereas with females, there was no distinct difference when it came to winning or losing the competition (Filippin & Gioia, 2016). Similarly, in risk behavior shown by Booth & Nolen, males are more likely than females to switch to a more risky choice after they have won previously (Booth & Nolen, 2012). Sutter & Rützler sought to understand when the competition becomes apart of an individual's innate behavior. They utilized an easy math task and a running competition depending on the age of the subjects. What was found through these tasks were that in the Western part of Austria, there is a large gender gap for willingness to compete between boys and girls (Sutter & Rützler, 2010). They found that this gender gap comes as early as the age of three-year-olds and persists throughout life (Sutter & Rützler, 2010).

The background of culture leads to more insight into how individuals are behaving. Gneezy et al show inside their experiment where they had a competition task of underhand tossing a ball into a bucket for different monetary amounts per round that women will outcompete men (Gneezy et al, 2009). They found that in the matrilineal line, the women were highly competitive, whereas when compared to a patriarchal society in Tanzania women under competed (Gneezy et al, 2009). We see when women are competing for their offspring that they compete just as much as men and eliminate the gender gap (Cassar, 2016). Throughout the competition literature, what is consistent are the factors of understanding what circumstances each subject is facing when experiencing pressure to express their own behavior.

2.4 Risk Behavior

Classical theories of risk used an expected utility framework (EU). Within this model, the utility function is concave which characterizes the risk preferences (Sheremenko & Magnan, 2015). One risk aversion parameter of σ encompasses all of the individuals risk preferences (Sheremenko & Magnan, 2015). This becomes quite restrictive and thus unrealistic for most frameworks of individual's behaviors. There is the Prospect Theory from Kahneman and Tversky that adds in the "risk aversion σ, loss aversion λ, and a non-linear probability weighting process of α" (Sheremenko & Magnan, 2015). Adding in loss aversion allows us to accurately take into consideration why individuals are making those decisions leading to be more risk averse or risk tolerant. A utility function can then be conceptualized by:

$$U(x, p; y, q) = \{v(y) + \pi(p)(v(x) - v(y)) \text{ for } x > y > 0 \text{ or } x < y < 0$$

$$\text{and } \{\pi(p)v(x) + \pi(q)v(y) \text{ for } x < 0 < y$$

$$\text{where } v(z) = \{ z^{1-\sigma} \text{ for } z > 0$$

$$\text{and } \{-\lambda(z^{1-\sigma}) \text{ for } z < 0,\ z = x, y, \text{ and } \pi(p) = \exp[-(-\ln p)^{\alpha}]$$

where we find from Sheremenko & Magnans' paper that x and y are possible outcomes while p and q are probabilities from those outcomes (Sheremenko & Magnan, 2015). If an individual were to be risk-averse then their σ would be greater than 0, if they were to be risk neutral $\sigma = 0$ and then if they were risk loving σ would be less than 0. The α determines the probability weighting so if α is less than 1, the individual overweighs a low probability of an uncertain event happening

whereas is α is greater than 1 they underweight a high probability of an uncertain event happening. Loss aversion, λ gauges the amount they feel. So, a larger λ would mean more loss aversion to the individual (Sheremenko & Magnan, 2015).

Risk aversion has been seen to be much higher in women than it is in men similar to how the competition literature shows. This leads to environmental and contextual notions, where depending on where an individual is placed in their life, their behaviors will be skewed in different manners. In an experimental study by Croson & Gneezy, they find that women are much more risk-averse than men are through probability lotteries (Croson & Gneezy, 2009). They highlight that women have different preceding emotions that overcompensate their behaviors to act more risk-averse; whereas when we look at men they tend to be more confident (for no real reason) and thus will continue to behave in a risk-loving manner (Croson & Gneezy, 2009).

If we look at an experiment in China with college entrance exams (which are known the be the most competitive around the world) we can see that higher levels of stress leads to females acting less competitive and much more risk-averse than their male counterparts (Lu et al, 2018). In this case, the stress that the individual's experienced was the college entrance exam. Previous to experiencing the exam, Lu et al found that females and males competed nearly the same, it was after encountering the stress that females became significantly more risk-averse to gambles (Lu et al, 2018). Yet, if we look in Ghana through asset allocation decisions, Hillesland found no significant gender differences with risk aversion (Hillesland, 2019). Wealth is held individually instead of being pooled within household members. Typically, a poorer household will accumulate a lower amount of assets while physically holding a significant amount of savings in the form of cash in case of negative shocks (Hillesland, 2019).

Negative shocks can be those of natural disasters such as tornadoes, drought, or hurricanes which lead to a huge amount of loss and damage affecting many future aspects of people's lives. Exposure to these types of natural disasters begins to shape an individual's behaviors of risk preferences and attitudes. Brown et al studied the impact of Cyclone Evan in Fiji on their household risk attitudes (Brown et al, 2017). What they find is from the initial strike, their future expectations of losing assets during the next 20 years increase while they become more risk averse (Brown et al, 2017). We see this often in agriculture around subsistence farming where risk tolerance is extremely low. Fertilizer can sometimes be seen as a more risk tolerant adoption by farmers. In Kenya, a study looks at how females and males uptake the adoption of

fertilizer and find that women who are empowered still are more risk-averse than males. They see less fertilizer being used by women than men, as well as a less risky type of fertilizer (Sheremenko & Magnan, 2015). Overall, the risk literature compliments the competition literature on how women seem to lean on the safer side and are risk averse while also under-competing than men.

3. Data and Experiment

3.1 Hypothesis

We hypothesize that behavioral choices are strongly correlated to determine student's overall well-being in Sierra Leone. Further, we hypothesize that within those choices there will be gender differences leading to well-being differences.

3.2 Collaborating Partners

To facilitate this research, we reached out to BRAC-Sierra Leone to collaborate with and utilize their resources. BRAC is an international poverty alleviation nonprofit organization that primarily works within Sub-Saharan Africa and has locations all over the country. They helped survey and conduct the experiments on the sample.

3.3 Sampling Strategy

This study takes place in three of the four provinces in Sierra Leone, Makeni (Northern), Kenema (Eastern) and Freetown Western Rural (Western). The country is fairly segregated in levels of income where Freetown has the most income, Makeni is the second most affluent and then Kenema would be the most underdeveloped of the three. This allows us to make a comparison for competitive behaviors in the subjects between different levels of income. Each area is extremely representative of how well a household is doing subsistence wise. The sample consists of six schools, two in each of the areas. Within the sampling we have multilevel randomization: we first randomize at the school level where the district offices provided a thorough list of all the schools in their specific area. From there we randomized at the individual level of the girls and boys for who will take part in the experiments and surveying. In each school, the children are in the grades of class 6, JSS1, JSS2, JSS3, SS1, SS2, and SS3 (sixth grade to twelfth grade), varying between 13-20 years old.

The survey had been administered as privately as possible but being at a school many other people are around. In our entire sample of surveying, we have 810 girls and 94 boys totaling to 904 students. For the experiments that were conducted, we randomly selected a sub-portion of the entire sample to acquire 159 girls and 94 boys for a total of 253 students. To accurately capture how competitive girls are, we need to ensure the environment remains the same as it would be day to day, which means the opposite sex is necessary. Girls may behave in different manners if they are with their same sex, and what we want are how they perform and feel every day normally. Having the opposite sex as a part of the experiment is to attempt to replicate the natural environment. Through this, we can hopefully see what differences in choices girls and boys decide and see how that is affecting their overall well-being.

3.4 Experiments

3.4.1 Overview

The economic experimental tasks are the key focus of this study to measure how competitive and risk tolerant young girls are in their daily lives. Previous literature has shown that women are less competitive and assertive than men. The best way to replicate this and attempt to measure those characteristics first hand is to use behavioral experimental tasks. In total we administer three tasks in random order each time administered, Competition, Risk, and Willingness to Pay where each of them is required in the final analysis. Without one of them, the results could be confounded for endogeneity and there are parts of behavior we would not be able to control for.

An in-depth overview of the behavior games is in Appendix B; however, this will cover a brief layout. We utilize a standard piece-rate and tournament style game scheme common within competition literature. The competition game has four rounds with simple mathematical equations of addition such as 1+4+7+8+3+1+6=? Through assessment of mathematical competency in the subjects during piloting, we altered the original equations to only be single digit numbers as shown. In each of the rounds, there is the possibility of winning a monetary amount or a prize. The final payout is randomized at the end of the tasks and is told to the subjects before the experiments are conducted. This is to encourage innate competitive behavior in every single round.

Each round has a time constraint of three minutes. Round 1 and round 2 are mandatory rounds of the choice already given between a piece rate (competing against yourself) and tournament (competing against a classmate). In the piece rate, for every correct answer, the subject could win 1,000 Leones, whereas in the tournament for every correct answer they have the possibility of winning 2,000 Leones depending on their anonymous opponent. Round 3 and round 4 are where the subjects can choose between competing against themselves or against one of their classmates (who is kept anonymous). This choice is presented before the round has begun and each subject must have chosen before the enumerators continue conducting the task. Having a time constraint is to exert an amount of pressure on each individual to see what choices they will make when we ask if they would like to compete against themselves or an anonymous opponent in the third and fourth round. From their choices is how we can quantitatively analyze how competitive one is.

The risk game has no time constraint and is measured as a series of choices. There are six options ranging from a low monetary amount with low risk, gradually increasing the monetary amount with higher risk. Each option has two outcomes with a 50/50 probability of winning one of them via the flip of a coin. Collecting the choice each student decides, allows us to have a risk indicator in the final analysis. In the survey, there are risk questions which will be used with their choice to differentiate if a student may be more risk-taking thus acting more competitive in the competition game.

Willingness to pay is similar to the risk game where we have it played out to have a control in the final analysis. In the game itself, there are a series of choices between a small increasing monetary amount and a prize of an equivalent amount that remains constant. The prize we had chosen were school supplies because through piloting we found the children were in need of notebooks and pens/pencils. We are evaluating at what point would the student want the monetary amount over the prize. Through their choice in this we can determine that it is not from their desire for the prize or monetary value that entices them to be more competitive in the competition game.

3.4.2 Conducting the Experiments

The experiments were performed at the schools in a classroom setting with an average of 45 students. The reasoning for the experiments to be conducted at the school was because it was more convenient having the children all at the same place rather than attempt to gather them outside of school, and thus vastly more feasible. Inside the classroom, the students for each setting had around 30 girls and 15 boys at a time with all five of our enumerators. All the enumerators attended to ensure no cheating and to move smoothly and efficiently from one task to another. The experimental protocols are in Appendix B.

4. Methodology

When measuring self-esteem and aspirations in individuals there are a variety of different questions within a survey to depict what is occurring within them. This requires Likert scales inside the survey questions with answer of how each is feeling such as "Strongly Disagree" to "Strongly Agree" ranging from 1-7, 1 being the lowest and 7 being the highest. With multiple questions asking vaguely the same thing, we form them into one index to portray that one emotion in total. This allows for a more comprehensive way to determine what the data are saying while ensuring there is no multicollinearity or somewhat highly correlated variables within the regression as right-hand side variables. The form of the index we use here is a Kling index. This weighs each variable the same and allows us to analyze the coefficients in a clearer manner.

4.1 Model Specification

Our summary statistics table in Table 1 shows that our sample is fairly similar to each other, which supports us having a well-rounded representation of the population. Since our sample is experimental data, we can go forward with an Ordinary Least Squared (OLS) regression to depict what is occurring. We cluster our standard errors at the class section level with 32 clusters to hold as a robustness check in the regression.

$$Y_i = \alpha_i + \beta_1 Female_i + \beta_2 PolyHouse_i + \beta_3 (Female*PolyHouse)_i + \beta_4 JobActiv_i + \beta_5 R3Cash_i + \beta_6 Confid_i + \beta_7 ProbWin_i + \beta_8 RiskTol_i + \gamma + \varepsilon_i$$

From the regression stated above we have the outcome variable y_i for each well-being index of Future Aspirations, Female Empowerment, Happiness, and Stress. There are dummy variables

for *Female*, *PolyHouse*, *Job Activ*, and *R3Cash*. *JobActiv* is if the subject is employed or not, so we can have a proxy for income within the population to complement the school variable within our controls. Each area within the country can be defined by their province of how affluent they are. *R3Cash* is dealing with their choice in competitiveness for if they chose to participate in the tournament of the experiment. We do an interaction term of *Female*PolyHouse* to see what is happening within those specifically. *RiskTol* is a proxy for how risk tolerant a subject is which is supported through the survey questions and the risk task. From the six lotteries in the task, their choice determines how risk averse a subject is. *Confidence* is a proxy for how confident the subject is determined through a question in the experiment of what they believed their opponent had scored in the mandatory tournament. *ProbWin* is a proxy for their probability of winning the game which is determined through the number of correct answers within round 2. This allows for a baseline of competitive behavior. We have γ as controls of age, tribe, and school with ε_i as the error-term.

4.2 Results

From the experiments we have two graphs that will begin to show us the primary choices of all the students in the Competition game and the Risk game. Figure 1 shows the Tournament Choices from the Competition game separated by gender and by Round 3 and Round 4. In Round 3 the students were choosing to compete for cash. Here in Figure 1 we see that 72% of girls chose to compete in this round whereas there was 79% of boys choosing to compete. Moving to the next bar we have Round 4 where the students were choosing to compete for the prize of school supplies. In this round, we have 66% of girls opting to compete while their male counterparts had 76% choosing to compete. For both genders, we see a drop from the cash round to the prize round which can indicate that income may have some sort of effect influencing their decision making. We also see that in both rounds, the boys are showing more competitive behavior compared to the girl students. In the literature on competitiveness with the genders, it is common to see results where boys are outcompeting their female counterparts. Considering that the areas our sample is from in Sierra Leone are in the rural areas of the country, this falls in line with results Bjorvatn et al had when looking at competitive behavior between genders. They had a similar experimental design of a variety of questions and time limits, where they administered multiple choice questions on mathematics and other topics. In the rural setting, girls were significantly less likely to compete compared to the boys in their classes (Bjorvatn et al, 2016).

We then have Figure 2: Risk Tolerance where we have it split between the genders in the bar graph. The data from this graph is from the Risk Game mentioned earlier with the experiments. Inside this game we have the students choose one lottery out of six options ranging from being very risk-averse to high risk taking. The graph is representing the choice of the lottery each student chose. What we see are that boys are choosing a lottery leading towards being more risk tolerant with the score of 3.36. Interestingly, when we look at the girls in the sample we have their average being higher than those of the boys with a scoring average of 3.61. According to most literature, this is contradictive because we usually see that if the girls are less competitive, it would also be represented in their risk aversion choices. Our results may be because there were more girls in the sample, so their average rose merely because of the size compared to the boys.

Moving along with the subjective well-being analysis, it is imperative that when we analyze the results, we take them as correlations and not causal impacts. Subjective well-being can be highly endogenous of itself when explaining how behavior is formed within individuals. This is because we cannot explicitly determine if an action was caused because of a feeling or state of mind of that individual at a specific time, or if the individual is feeling a certain way caused by the action. They play off each other and can sometimes get tied together. Although our results are not causal, we can still make correlational interpretations of how students in Sierra Leone from each area of the country are feeling about themselves through the behavioral actions they make in the experimental tasks assigned and look towards more research later.

From our main regression specification, we have four different outcome variables: Future Aspirations, Female Empowerment, Happiness, and Stress. All of these regressions have the standard errors clustered at the class section level with 32 clusters to hold as a robustness check on the significance of the regressions. In Table 2 we have the outcome variable as individuals Future Aspirations Index. This index is formed around subjective questions about how each of the subjects is hopeful of the future. The questions asked within the survey range from worrying about the future to wanting to go to college and obtain a degree. Each of the questions is scaled from 1 being "Strongly Disagree" up to 7 with "Strongly Agree" and are weighted equally when we form the Kling Index for the analysis. Within this regression, we see that the only variable that is statistically significant across all conditions is the income variable. This variable is asked if the subjects are currently employed while also attending school. Since female is within the

regression as a dummy variable we can make the interpretations compared to males. The comparison of coefficients can be made through standard deviations because of how the index was formed. The table shows that if the subject is female and they are employed, they have little to no future aspirations for themselves with the coefficient of -0.318 standard deviations being significant at the 1% level. The behavioral aspects of the regression do not seem to show any significant value as to how the subjects are feeling towards their future aspirations. This may be because income plays a much larger part in individuals overall well-being and is overshadowing the other variables.

In Table 3 we have the Disempowerment Index which was formed the same way as the Future Aspiration Index. The questions inside this index were all framed in the notion that men had more power with 7 being "Strongly Agree" and 1 being "Strongly Disagree". Keeping that in mind, when we analyze the coefficients if they are positive that means the subjects believe that men should have more power than women in a variety of different ways within their culture. Inside the table, we see that the only variable that shows any significance is the female dummy variable. Across all the controls being added in, the female coefficient becomes more positive and more significant at the 1% level, telling us that females at a young age believe that all of the household power is held by the male. This is tied together with them needing to ask permission if they can continue their education, as well as obtaining a job after they are married. Similarly, as the Future Aspirations, we do not find any of the behavioral characteristics to be of any significance here showing that their decisions in the experimental games are not having a strong correlation with how individuals are feeling disempowered.

Moving to Table 4 with our outcome variable as the Happiness Index of the individuals we see a similar effect as the Future Aspirations Index. The main variable that is affecting the subjects' well-being is the income variable if they are employed or not. The female variable turns on and off once more controls are added, so we can focus primarily on their income. The coefficient is 0.464 significant at the 1% level and is negative meaning females who are employed are extremely unhappy with their lives currently. One of the behavioral characteristics are significant, that of their probability to win in the competition game. It is negative showing that in the game, they scored extremely low in the mandatory tournament in Round 2. This is showing a negative correlational effect on their happiness of the coefficient of 0.464 standard deviations at the 10% level of significance.

In Table 5 we have the Stress Index as our outcome variable. This is framed with questions along the lines of "do you feel stressed on a daily basis" with the same scale as the other indices. In the scale, 1 is they do not feel very stressed out whereas 7 is highly stressed. Inside the table, we see that more of the variables seem to have an active role with the subjects' stress well-being levels. The variable female is positively significant at the 1% level with the coefficient of 0.459 standard deviations. What this is result is telling us is that being female in rural Sierra Leone as a young student is negatively affecting the stress levels of the individual. This meaning that if they are female, they are highly more stressed out than their male counterpart by 0.459 standard deviations. Working alongside this, being from a polygamous household as well as being female (the interaction term in the regression of Poly-Female) is negatively affecting the subjects' stress with the coefficient of 0.302 standard deviations comparative to their male counterparts. Again, we see that the income variable of being employed while attending school is extremely significant at the 1% level with the coefficient of 0.487 showing that the girls are 0.487 standard deviations more stressed out than their male counterparts in the schools.

Within this regression we do see the behavioral characteristics having a more distinctive role in determining the overall stress of the individuals. We see that the variables confidence, probability to win, and risk tolerance are all statistically significant. The confidence variable is that of how the subject did themselves in the Round 2 mandatory tournament subtracted from how they thought their anonymous opponent did in that round. According to the regression, the coefficient for confidence is 0.00947 being statistically significant at the 1% level. It is negative indicating that when the females are confident, their stress levels are much lower. Alongside with their confidence is their risk tolerance. This variable is statistically significant at the 5% level with the coefficient at 0.0813 and is negative. Similar to the confidence variable, because this is negative, it shows that if females are more risk-loving their stress levels are much lower than those of their male counterparts by 0.0813 standard deviations. The last variable that stands out inside this regression is the probability of winning the game which as mentioned previously, is based on how many points the subject achieved in Round 2 mandatory tournament. In this case, we find that females' probability to win has a positive coefficient indicating the more correct answers they answered in the tournament led to them being more stressed out with a coefficient of 0.00941 being statistically significant at the 1% level. For this specific regression, we do see that the behavioral characteristics are playing a much larger role when determining stress well-being in subjects. These characteristics combined with their income levels are indicating to us

that the average Sierra Leonean female student is highly stressed out and we can see through the decision making the effects of their stress levels.

To further identify what is occurring between the genders, we split them apart in Table 6 to see how the outcomes are being affected differently. Looking at the boys compared to the girls with the coefficients all in standard deviation form, we see that income is playing a huge role for the girls whereas it does not seem to be a factor for the boys in our sample. If the females are employed they are more stressed out with a coefficient of 0.859 being statistically significant at the 1% level, less happy at a negative coefficient 0.469 and statistically significant at the 1% level. They have fewer future aspirations with a negative coefficient of 0.320 at the significance level of 5% and they feel more disempowered at a coefficient of 0.572 being statistically significant at the 5% level. The behavioral characteristics are showing a lot of importance at determining the well-being when we separate the genders. The competitiveness variable is a strong indicator for the boys for nearly all the outcomes, whereas for the girls the variable does not seem to matter as much. For the boys if they are showing more competitive behavior, they are less stressed out with a negative coefficient of 0.429 with a significance at the 1% level, they are less happy with a negative coefficient of 0.714 being statistically significant of 5% level and lastly, they feel more empowered with the coefficient at 0.570 with the significance level at the 10% level.

For females the competitive variable does not hold significance but when we look at the confidence variable there is more value as a determinant for their well-being and holds small significance for the males. If this variable has a negative coefficient, then the subject is less stressed out for the Stress Index. We see that this is true for both genders. For the males their coefficient is 0.00588 being statistically significant at the 5% level, whereas for the girls it is at 0.00930 and is statistically significant at the 1% level. This variable is an important indicator for the other outcomes for females but has no value for the males. When we look at the Happiness and Future Aspirations outcomes, we see a positive coefficient for both being significant at the 5% level indicating that through the experimental games when the girls are showing confidence they will tend to be happier and have more aspirations for their future. The confidence has no significance for the rest of the boy's outcomes, or the girls when the outcome is Disempowerment. The next behavioral variable that shows to have importance is the probability to win, although this is only significant when we have the outcome variable as Stress for the girls. With the coefficient being a positive value of 0.0122 being statistically significant at the 1% level, the

variable indicates that the girls who did better in Round 2 of the mandatory tournament are more likely to be stressed out. The risk tolerance is a strong indicator for both females and males, but not for all the same outcome variables. For the boys, we see that being more risk tolerant leads to lower stress levels and lower happiness in their well-being. In Stress, we have the coefficient as a negative 0.108 being significant at the 5% level and in Happiness, we see the coefficient negative again at 0.126 significant at the 10% level. Whereas when we look at the girls' side of the regression table we see that the risk tolerance variable is a strong indicator for the outcome variables of Stress and Future Aspirations. The coefficient for the Stress outcome is a negative 0.100 and is statistically significant at the 5% level meaning that if the girls have higher risk-tolerance, they are less stressed out similar to the boys. As for the Future Aspirations outcome our coefficient is a positive 0.107 being statistically significant at the 1% level and is indicating that when the girls are more risk tolerant, they tend to have more positive future aspirations for themselves.

What some of these results are showing us when the subjects are pooled together are that there are very little instances when we can see the behavioral characteristics determining the subjective well-being outcomes of Future Aspirations, Happiness, and Disempowerment of the individuals until we separate out the genders to look at them specifically. We notice that income is playing more of a role in determining how the subjects are feeling overall, which is consistent with scarcity and poverty literature. When individuals' minds are strained due to outside pressures, such as financial needs and malnutrition, this deviates how the brain works and how attention spans are directed. Income becomes even more important when we look at the outcome of our Stress Index. Within this specific index, we see a much larger role of the behavioral characteristics showing us that their actions can be a correlated determinant of stress levels in the young students. For both of the genders, we see that almost all of the behavioral variables are strong indicators of how stressed out the subjects are with their lives in rural Sierra Leone. This is especially clearer with the boys in our sample, as we see that having a job is not as straining on them as it is for the girls we have sampled.

5. Discussion

Subjective well-being has been deemed as this umbrella term by psychologists as the overall life satisfaction and happiness individuals achieve in their lives. What we have been doing is dissecting this term through manners of income and poverty, gender inequality, competitive and

risk-taking behaviors. From this we sought out to see correlational behavioral determinants of the overall well-being students have in rural Sierra Leone through the decisions they made in the experimental economic tasks performed matched with a comprehensive survey. These behavioral decisions the subjects made in the tasks cannot be said to be causal due to the tight tie between feelings and actions, though we are able to understand more quality information of the well-being status of students in a rural population to begin further research within non-WEIRD areas.

Through the results in our analysis, we see that when the subjects are pooled together, income is a strong indicator for the outcome index variables of Future Aspirations, Happiness, and Stress. Although, when we look at the Disempowerment index what is highlighted there is if the subjects are female. Further, within Stress we see the behavioral determinants holding much more power with the outcome. Once we separate the genders and run each of the outcome variables again, we see the behavioral characteristics being a more active indicator all around for both boys and girls. The income variable of whether the subjects have a job is only being highlighted within the girls' sample, so when pooled altogether that could be overshadowing the behavioral characteristics. This could be a main reason as to why we do not see a more active role of those behavioral characteristics when the whole sample is presented together. The data presented here has been supported by corresponding behavioral literature around competitive and risk-taking nature combined with gender. We have been attempting to combine those with subjective well-being measurements to more accurately understand how a different portion of the world is behaving to have a better representation than WEIRD areas. From this data we can make some claims of rural Sierra Leone, to then hopefully go more in depth in future research to obtain more information on the overall well-being of individuals.

References

Apicella, C., Demiral, E., & Mollerstrom, J. (2017). No Gender Difference in Willingness to Compete When Competing Against Self. *SSRN Electronic Journal*. doi:10.2139/ssrn.2914220

Becker, G. (1976). Altruism, Egoism, and Genetic Fitness: Economics and Sociobiology. *Journal of Economic Literature,14*(3), 817-826. Retrieved from http://www.jstor.org/stable/2722629

Björkman, K. (n.d.). Subjective Well-Being and Environment: A GIS-Based Analysis. http://lup.lub.lu.se/student-papers/record/8932256/file/8932269.pdf

Bjorvatn, K., Falch, R., & Hernæs, U. (2016). Gender, context and competition: Experimental evidence from rural and urban Uganda. *Journal of Behavioral and Experimental Economics, 61*, 31-37. doi:10.1016/j.socec.2016.02.001

Booth, A.L., & Nolen, P. (2012). Salience, risky choices and gender. *Economic Letters, 117*(2), 517-520. doi:10.1016/j.econlet.2012.06.046

Booth, A.L., & Nolen, P. (2012). Gender Differences in Risk Behaviour: Does Nurture Matter? *The Economic Journal, 122*(558). doi:10.1111/j.1468-0297.2011.02480.x

Brown, P., Daigneault, A. J., Tjernström, E., & Zou, W. (2018). Natural disasters, social protection, and risk perceptions. *World Development, 104*, 310-325. doi:10.1016/j.worldde.2017.12.002

Cameron, L., & Shah, M. (2013). Risk-Taking Behavior in the Wake of Natural Disasters. doi:10.3386/w19534

Cassar, A., Wordofa, F., & Zhang, Y. J. (2016). Competing for the benefit of offspring eliminates the gender gap in competitiveness. *Proceedings of the National Academy of Sciences, 113*(19), 5201-5205. doi:10.1073/pnas.1520235113

Ccrdenas, J., Dreber, A., Essen, E. V., & Ranehill, E. (2014). Cooperativeness and Competitiveness in Children. *SSRN Electronic Journal*. doi:10.2139/ssrn.2430286

Cotton, C., Mcintyre, F., & Price, J. (2015). Which Explanations for Gender Differences in Competition are Consistent with a Simple Theoretical Model? *SSRN Electronic Journal*. doi:10.2139/ssrn.2556408

Croson, R., & Gneezy, U. (2009). Gender Differences in Preferences. *Journal of Economic Literature, 47*(2), 448-474. doi:10.1257/jel.47.2.448

Dang, Ai-Thu. "Amartya Sen's Capability Approach: A Framework for Well-Being Evaluation and Policy Analysis?" *Review of Social Economy*, vol. 72, no. 4, 2014, pp. 460–484., doi:10.1080/00346764.2014.958903.

Dolan, P., Peasgood, T., & White, M. (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of Economic Psychology, 29*(1), 94-122. doi:10.1016/j.joep.2007.09.001

Dollar, D., & Gatti, R. (n.d.). Gender Inequality, Income, and Growth: Are Good Times Good for Women? *Development and Research Group The World Bank*. http://worldbank.org/gender/prr

Duflo, E. (2011). Women's Empowerment and Economic Development. doi:10.3386/w17702

Duflo, E., Dupas, P., Kremer, M. (2014). Education, HIV, and Early Fertility: Experimental Evidence from Kenya. doi:10.3386/w20784

Filippin, A., & Gioia, F. (2016). Competition and Subsequent Risk-Taking Behaviour: Heterogeneity Across Gender and Outcomes. http://www.sciencedirect.com/science/article/pii/S221480431830185X

Fiore, A.M., & Delong, M. R. (1990). Rosenberg Self-Esteem Scale—Appearance-Specific Physical Self-Esteem Version. *PsycTESTS Dataset*. doi:10.1037/t40193-000

Gupta, N. D., Poulsen, A., & Villeval, M. C. (n.d.). Gender Matching and Competitiveness: Experimental Evidence. https://onlinelibrary.wiley.com/doi/full/10.1111/j.1465-7295.2011.00378.x

Hillesland, M. (2019). Gender differences in risk behavior: An analysis of asset allocation decisions in Ghana. *World Development*, *117*, 127-137. doi:10.1016/j.worlddev.2019.01.001

Höffe, O. (1978, 1997, 2006). Appendix: John Rawls on the Alterations in the German Translation of A Theory of Justice. *John Rawls, A Theory of Justice*, 213-218. doi:10.1163/9789047431060_014

Kabeer, N. (1996). Agency, Well-being & Inequality: Reflections on the Gender Dimensions of Poverty. *IDS Bulletin*, *27*(1), 11-21. doi:10.1111/j.1759-5436.1996.mp27001002.x

Kingdon, G. G., & Knight, J. (2006). Subjective well-being poverty vs. income poverty and capabilities poverty? *Journal of Development Studies*, *42*(7), 1199-1224. doi:10.1080/00220380600884167

Lane, T. (2017). How does happiness relate to economic behavior? A review of the literature. *Journal of Behavioral and Experimental Economics*, *68*, 62-78. doi:10.1016/j.socec.2017.04.001

Lu, Y., Shi, X., & Zhong, S. (2018). Competitive experience and gender differences in risk preference, trust preference and academic preference: Evidence from Gaokao in China. *Journal of Comparative Economics*, *46*(4), 1388-1410. doi:10.1016/j.jce.2018.05.002

Mullainathan, S., & Shafir, E. (2014). *Scarcity: The new science of having less and how it defines out lives*. New Yok: Picador

OECD (2013) , OECD Guidelines on Measuring Subjective Well-being, OECD Publishing, http://dx.doi.org/10.1787/9789264191655-en

Osili, U. O., & Long, B. T. (2007). Does Female Schooling Reduce Fertility? Evidence from Nigeria. doi:10.3386/w13070

Pamuk, E. R., Fuchs, R., & Lutz, W. (2011). Comparing Relative Effects of Education and Economic Resources on Infant Mortality in Developing Countries. *Population and Development Review*, *37*(4), 637-664. doi:10.1111/j.128-4457.2011.00451.x

Pollak, Robert A., (2002). Gary Becker's Contributions to Family and Household Economics. doi:10.3386/w9232.

Razavi, S. (n.d.) Gendered Poverty and Well-being: Introduction. Retrieved from https://www.researchgate.net/publication/228027929_Gendered_Poverty_and_Well-being_Introduction

Riley, Emma 2017. "Increasing students' aspirations: the impact of Queen of Katwe on students' educational attainment," CSAE Working Paper Series 2017-13, Centre for the Study of African Economies, University of Oxford.

Sen, A. (1995). Gender Inequality and Theories of Justice 1. *Women, Culture, and Development*, 259-273. doi:10.1093/0198289642.003.0011

Sheremenko, G., & Magnan, N. (2015). Gender-specific Risk Preferences and Fertilizer Use in Kenyan Farming Houesholds. http://ageconserach.umn.edu/bitstream/2057766/2/Sheremeno_Magnan_AAEA.pdf

Sutter, M, Rützler, D. (2010). Gender Differences in Competition Emerge Early in Life. http://ftp/iza.org/dp5015.pdf

Figure 1: Round 3 Choice Cash and Round 4 Choice Prize Among Boys & Girls

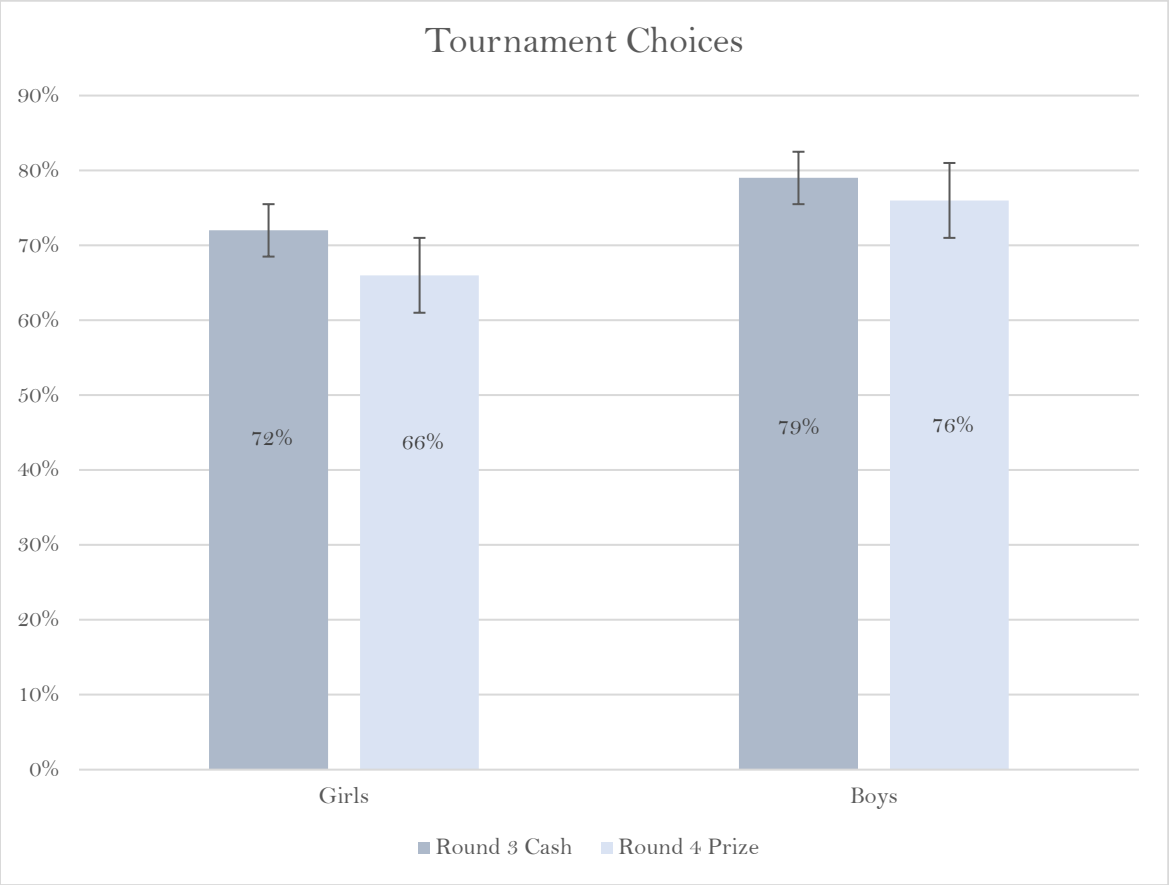

Figure 2: Risk Tolerance

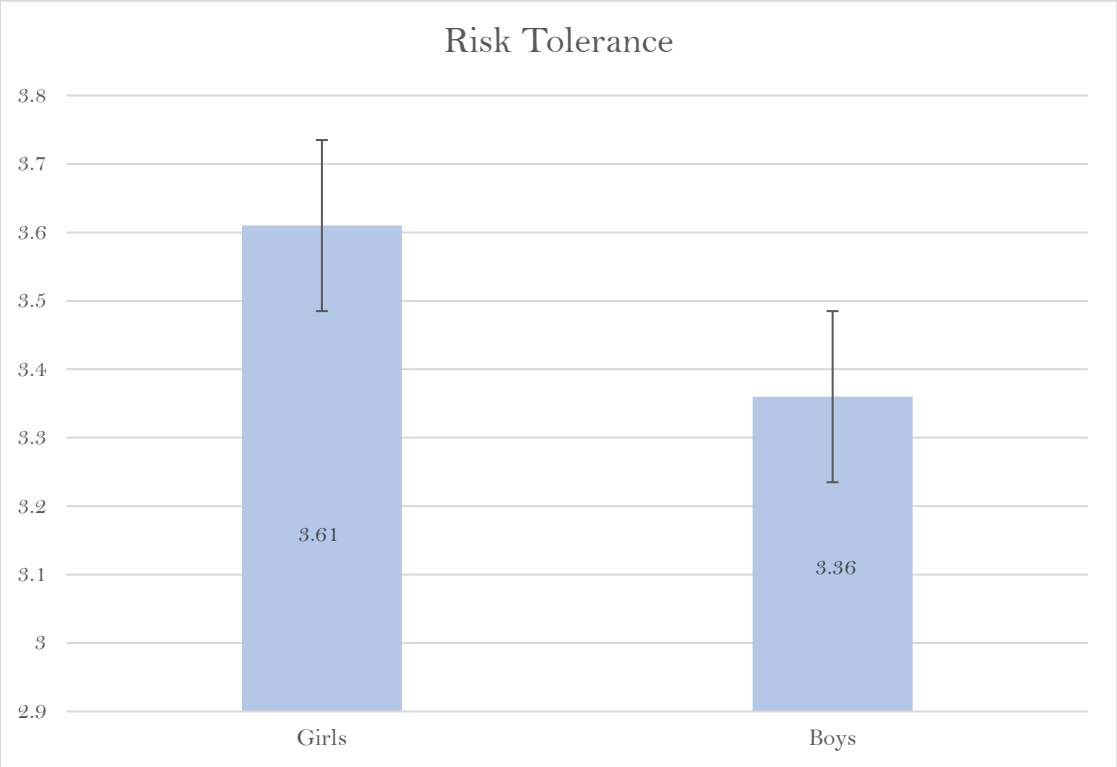

Table 1: Summary Statistics Table

Factor N	Female 159	Male 94	p-value
Grade, mean, (sd)	3.39 (1.018)	3.63 (1.255)	<0.001
Age, mean, (sd)	15.107 (1.663)	15.409 (1.968)	0.2
Religion, mean, (sd)	0.132 (0.339)	0.222 (0.418)	0.065
Tribe, mean, (sd)	0.283 (0.452)	0.375 (0.488)	0.38
Risk, mean, (sd)	3.61 (1.909)	3.36 (1.911)	0.005
Cash Choice, (sd)	72.3% (0.449)	79.8% (0.404)	0.18
Prize Choice, (sd)	66% (0.475)	76.5% (0.426)	0.077
Stress Index, mean, (sd)	0.353 (1.09)	0.246 (0.84)	<0.001
Happiness Index, mean, (sd)	0.0.51 (1.021)	0.3552 (1.070)	0.0256
Future Index, mean, (sd)	0.143 (1.098)	0.137 (0.885)	0.97
Disempowerment Index, mean, (sd)	0.158 (0.974)	0.625 (1.292)	<0.001

Table 2: Future Aspirations Index Regression

Variables	(1) Future Index	(2) Future Index	(3) Future Index	(4) Future Index	(5) Future Index	(6) Future Index	(7) Future Index
Demographics							
Female	-0.0125	-0.00732	-0.106	-0.0638	-0.0526	-0.0678	-0.0340
	(0.143)	(0.141)	(0.184)	(0.179)	(0.178)	(0.181)	(0.189)
Age	-0.00814	-0.0104	-0.00841	-0.00334	-0.00346	-0.00334	-0.0168
	(0.0409)	(0.0415)	(0.0409)	(0.0402)	(0.0407)	(0.0419)	(0.0412)
Social Characteristics							
Polyhouse		0.106	-0.0291	-0.00799	-0.00911	0.0207	0.249
		(0.121)	(0.163)	(0.169)	(0.166)	(0.164)	(0.191)
Poly-Female			0.215	0.179	0.174	0.157	0.0724
			(0.200)	(0.193)	(0.188)	(0.180)	(0.202)
Income							
Employed				-0.284**	-0.283**	-0.298**	-0.318***
				(0.118)	(0.118)	(0.116)	(0.115)
Behavior Characteristics							
Competitiveness					0.129	0.0945	0.0825
					(0.129)	(0.128)	(0.128)
Confidence						0.00382	0.00456
						(0.00229)	(0.00271)
Probability to Win						-0.00340	-0.00613
						(0.00338)	(0.00371)
Risk Tolerance						0.0558*	0.0385
						(0.0279)	(0.0292)
Region Controls	No	No	No	No	No	No	Yes
Tribe Controls	No	No	No	No	No	No	Yes
Constant	-0.00737	-0.0234	0.0110	0.0113	-0.0897	-0.0141	1.019
	(0.629)	(0.639)	(0.628)	(0.611)	(0.611)	(0.726)	(0.757)
Observations	252	252	252	252	252	250	250
R-squared	0.000	0.003	0.005	0.023	0.026	0.043	0.107

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Disempowerment Index Regression

Variables	(1) Disempowerment Index	(2) Disempowerment Index	(3) Disempowerment Index	(4) Disempowerment Index	(5) Disempowerment Index	(6) Disempowerment Index	(7) Disempowerment Index
Demographics							
Female	0.777***	0.783***	0.848***	0.832***	0.836***	0.849***	0.814***
	(0.175)	(0.181)	(0.252)	(0.264)	(0.263)	(0.260)	(0.258)
Age	0.0312	0.0285	0.0272	0.0253	0.0253	0.0286	0.0472
	(0.0361)	(0.0358)	(0.0359)	(0.0356)	(0.0357)	(0.0376)	(0.0346)
Social Characteristics							
Polyhouse		0.127	0.215	0.208	0.207	0.188	0.108
		(0.124)	(0.241)	(0.249)	(0.249)	(0.250)	(0.277)
Poly-Female			-0.141	-0.128	-0.129	-0.106	-0.0316
			(0.267)	(0.276)	(0.274)	(0.276)	(0.299)
Income							
Employed				0.104	0.105	0.112	0.170
				(0.125)	(0.126)	(0.131)	(0.146)
Behavior Characteristics							
Competitiveness					0.0418	0.0927	0.186
					(0.121)	(0.129)	(0.156)
Confidence						-0.000149	-0.00217
						(0.00263)	(0.00258)
Probability to Win						-0.00279	0.000825
						(0.00341)	(0.00350)
Risk Tolerance						-0.0567	-0.0230
						(0.0380)	(0.0386)
Region Controls	No	No	No	No	No	No	Yes
Tribe Controls	No	No	No	No	No	No	Yes
Constant	-1.090*	-1.109*	-1.132*	-1.132*	-1.164**	-0.880	-2.176***
	(0.554)	(0.565)	(0.575)	(0.578)	(0.555)	(0.579)	(0.655)
Observations	252	252	252	252	252	250	250
R-squared	0.104	0.107	0.108	0.110	0.110	0.126	0.171

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Happiness Index Regression

Variables	(1) Happiness Index	(2) Happiness Index	(3) Happiness Index	(4) Happiness Index	(5) Happiness Index	(6) Happiness Index	(7) Happiness Index
Demographics							
Female	0.316	0.320	0.475	0.539*	0.524*	0.514	0.523
	(0.230)	(0.232)	(0.297)	(0.303)	(0.300)	(0.310)	(0.333)
Age	0.0451	0.0431	0.0399	0.0476	0.0478	0.0523	0.0321
	(0.0406)	(0.0412)	(0.0422)	(0.0401)	(0.0397)	(0.0393)	(0.0385)
Social Characteristics							
Polyhouse		0.0922	0.304	0.336	0.337	0.358	0.447
		(0.136)	(0.238)	(0.274)	(0.268)	(0.270)	(0.315)
Poly-Female			-0.337	-0.391	-0.385	-0.395	-0.446
			(0.272)	(0.310)	(0.313)	(0.312)	(0.355)
Income							
Employed				-0.430***	-0.432***	-0.439***	-0.464***
				(0.128)	(0.123)	(0.130)	(0.127)
Behavioral Characteristics							
Competitiveness					-0.167	-0.195	-0.203
					(0.199)	(0.181)	(0.162)
Confidence						0.00409	0.00578
						(0.00326)	(0.00375)
Probability to Win						-0.00372	-0.00727*
						(0.00346)	(0.00391)
Risk Tolerance						0.0308	-0.00589
						(0.0377)	(0.0336)
Region Controls	No	No	No	No	No	No	Yes
Tribe Controls	No	No	No	No	No	No	Yes
Constant	-1.046	-1.060	-1.114	-1.114*	-0.984	-0.873	0.414
	(0.640)	(0.645)	(0.663)	(0.623)	(0.605)	(0.660)	(0.606)
Observations	252	252	252	252	252	250	250
R-squared	0.025	0.027	0.033	0.071	0.076	0.086	0.119

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Stress Index Regression

Variables	(1) Stress Index	(2) Stress Index	(3) Stress Index	(4) Stress Index	(5) Stress Index	(6) Stress Index	(7) Stress Index
Demographics							
Female	0.596***	0.594***	0.560**	0.472**	0.457*	0.498**	0.459**
	(0.172)	(0.173)	(0.217)	(0.221)	(0.226)	(0.218)	(0.214)
Age	0.0207	0.0216	0.0223	0.0117	0.0119	0.00914	0.0271
	(0.0457)	(0.0454)	(0.0459)	(0.0452)	(0.0439)	(0.0350)	(0.0326)
Social Characteristics							
Polyhouse		-0.0427	-0.0898	-0.134	-0.132	-0.195	-0.224**
		(0.0941)	(0.174)	(0.152)	(0.147)	(0.127)	(0.108)
Poly-Female			0.0750	0.149	0.156	0.198	0.302*
			(0.232)	(0.216)	(0.212)	(0.193)	(0.176)
Income							
Employed				0.593***	0.591***	0.624***	0.487***
				(0.185)	(0.182)	(0.167)	(0.162)
Behavior Characteristics							
Competitiveness					-0.166	-0.0826	0.00936
					(0.193)	(0.156)	(0.123)
Confidence						-0.00847***	-0.00947***
						(0.00198)	(0.00214)
Probability to Win						0.00774**	0.00941***
						(0.00297)	(0.00239)
Risk Tolerance						-0.116***	-0.0813**
						(0.0358)	(0.0352)
Region Controls	No	No	No	No	No	No	Yes
Tribe Controls	No	No	No	No	No	No	Yes
Constant	-0.554	-0.547	-0.535	-0.536	-0.406	-0.579	-1.512***
	(0.745)	(0.747)	(0.735)	(0.705)	(0.711)	(0.596)	(0.514)
Observations	252	252	252	252	252	250	250
R-squared	0.075	0.076	0.076	0.149	0.154	0.231	0.326

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Gender Differences Regression

	Boys				*Girls*			
Variables	(1) Stress Index	(2) Happiness Index	(3) Future Aspirations Index	(4) Empowerment Index	(5) Stress Index	(6) Happiness Index	(7) Future Aspirations Index	(8) Disempowerment Index
Social Characteristic								
Polyhouse	0.0732	0.209	0.0663	0.206	-0.0235	0.0346	0.288	0.104
	(0.102)	(0.369)	(0.198)	(0.286)	(0.142)	(0.185)	(0.171)	(0.173)
Demographic								
Age	0.0506	0.0588	0.0299	0.125*	-0.0178	-0.00425	-0.0247	-0.0167
	(0.0374)	(0.0551)	(0.0532)	(0.0669)	(0.0445)	(0.0456)	(0.0701)	(0.0491)
Income								
Employed	-0.102	-0.326	-0.269	-0.633	0.859***	-0.469***	-0.320**	0.572**
	(0.142)	(0.288)	(0.235)	(0.392)	(0.145)	(0.155)	(0.142)	(0.234)
Behavioral Characteristics								
Competitiveness	-0.429***	-0.714**	0.392	0.570*	-0.0373	0.118	-0.0115	0.0890
	(0.133)	(0.338)	(0.250)	(0.327)	(0.141)	(0.161)	(0.189)	(0.139)
Confidence	-0.00588**	-0.00215	0.000842	0.00246	-0.00930***	0.00803**	0.00585**	-0.00315
	(0.00253)	(0.00402)	(0.00677)	(0.00504)	(0.00240)	(0.00383)	(0.00282)	(0.00289)
Probability to Win	0.00523	-0.00696	-0.00810	-0.00739	0.0122***	-0.00634	-0.00405	0.00474
	(0.00368)	(0.00601)	(0.00791)	(0.00699)	(0.00271)	(0.00433)	(0.00578)	(0.00400)
Risk Tolerance	-0.108**	-0.126*	-0.0664	-0.0423	-0.100**	0.0612	0.107***	-0.00735
	(0.0430)	(0.0653)	(0.0471)	(0.0611)	(0.0464)	(0.0399)	(0.0302)	(0.0408)
Region Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tribe Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.139	0.606	0.291	-3.509***	-1.000	1.122	0.778	-0.598
	(0.525)	(0.789)	(1.106)	(0.987)	(0.755)	(0.843)	(1.372)	(0.890)
Observations	93	93	93	93	157	157	157	157
R-squared	0.595	0.289	0.182	0.281	0.374	0.224	0.176	0.129

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix A: Experiment Protocols

The exact experimental manual used for this project is available if necessary, they have the exact differences in what was used for each of the games to keep it appropriate for country needs.

This Protocol was taken from Alessandra Cassar's paper in 2016 for measuring competitiveness. It will be close to if not verbatim to hers.

1 Competition Game

The experimental design is within-subject. Each session consisted of four different rounds: the first three, administered in random order between sessions, were different treatments of a game designed to elicit a subject's desire to compete. The desire to compete elicitation task, with reward rules specific to each treatment, required subjects to add sets of five two-digit numbers, as many as possible in 3 min (such as 78 + 23 + 69 + 35 + 10 = ?). The number of correct solutions, our performance measure, was recorded as the subject's score. At the end of each round, the subjects were notified of their own performance but not what other subjects scored. Informed consent was obtained from all participants.

Rounds 1 and 2.

1.1Piece-rate.

To estimate a benchmark measure of gender difference in performance, and replicate standard protocol, we implemented a noncompetitive treatment: a piece-rate payment scheme in which every subject received tokens per correct answer.

1.2 Tournament.

Subjects were required to participate in a compulsory tournament in which the reward was 2 tokens for each correct answer but only if the subject scored higher than a randomly matched anonymous opponent (another subject in the experiment, of unknown sex). With ties, winners shared the payment equally.

Round 3

1.3 Choice-cash

Subjects had to choose under which payment scheme their next performance should be compensated: piece-rate (tokens) or tournament (double the amount of tokens). The three treatments described above are identical to the standard protocol in the literature. After the first

three rounds, subjects were asked to guess their opponent's score in the compulsory tournament. The difference between their own score and their guess of their opponent's score is used to proxy for their confidence in winning the tournament.

Round 4

1.4 Choice-prize

Subjects had to choose under which payment scheme their next performance should be compensated: piece-rate (tokens) or tournament (double the amount of tokens). The three treatments described above are identical to the standard protocol in the literature. After the first three rounds, subjects were asked to guess their opponent's score in the compulsory tournament. The difference between their own score and their guess of their opponent's score is used to proxy for their confidence in winning the tournament.

2 Risk

Risk tolerance is measured with a series of choices between a lottery and a certain payout. For the risk instrument, option A is a coin flip lottery with 50% chance of paying tokens and 50% chance of paying zero tokens. Option B is the certain token payout, in increasing increments. One of the 12 pairs of options are randomly selected from the instrument for each participant after he makes his choices, and the option he chose from the selected pair will be implemented. The advantage of the multiple token list is the transparency of its incentive compatibility. For example, a participant who values the coin flip lottery at 5 tokens certain payout will choose the lottery for all values of the certain payout below 5 tokens and will choose the certain payout when it is above 5 tokens. Risk tolerance is measured as the highest value of the certain payout for which the participant chose the, before switching to choosing the certain payout. This will underestimate risk tolerance (or certainty equivalent) by at most 2 tokens, the size of the certain payout option increment.

3 Willingness to Pay

Willingness to Pay is measured through options of cash and a prize. Each student is shown 12 choices between cash and the prize where the cash starts at a low amount and gradually increases to the same price as the prize and then goes mildly over the price of the prize. For each of the 12 choices, each subject chooses which they would rather have. When they switch their choice is how we can determine their willingness to pay.